

Severe Windstorm

Checklist

**For locations exposed to hurricanes, cyclones, typhoons
or severe localized winds**

Studies of severe windstorms show conclusively that windstorm-related damage can be prevented or at least minimized with an organized plan of action before, during and after a storm. Hurricanes, typhoons and cyclones are all tropical storms caused by severe low pressure systems, but they are called different names depending on where they happen. In the United States, Caribbean and Gulf of Mexico, these storms are called hurricanes, but in the West Pacific (China, Japan, Korea, the Philippines, Hong Kong, Taiwan) they are known as typhoons. And, in the South Pacific (Australia, Fiji, Samoa) and Indian Ocean, they are called cyclones. The season for these storms runs from June 1 to November 30 in the Northern Hemisphere and from December 1 through April 30 in the Southern Hemisphere.

If you don't have an action plan, it's not too late. Start planning right away. This checklist offers suggestions that you can build into your plan to minimize windstorm-related damage. Use the extra spaces provided to add procedures specific to your facility. If you need help, or would like someone to review your plan for you, contact your local FM Global office.



Severe Windstorm Checklist

Pre-Windstorm Planning

- Develop a windstorm emergency action plan, and educate appropriate personnel in its aims and procedures.
- Staff and train an emergency response team (ERT), whose members are willing to stay on site during a windstorm (*if safe to do so*). Ask for volunteers. Arrange for support/assistance during the storm for families of those who will remain at the facility. Also, notify local emergency preparedness authorities about your plans to have personnel on site.
- Designate a weather monitor, who will report weather conditions and keep the ERT leader up to date on conditions before, during and after a windstorm.
- Give the ERT leader the authority to implement the plan, based on predetermined checkpoints (e.g., when a storm is within a certain distance from a facility). This responsibility includes shutting down operations and sending personnel home.
- The ERT leader should also ensure that operational managers carry out predetermined tasks at each warning stage of the storm. To guarantee this, task checklists should be distributed to all involved, completed and returned to the ERT leader.

Elements of the Plan

- Identify all critical areas of a facility, and make sure someone on all shifts knows the proper shutdown procedures and is authorized to implement them.
- Maintain an updated list of the telephone numbers and contacts for local offices of emergency preparedness and your local FM Global office. Contact local authorities to plan and coordinate activities before the need for emergency action. That way, both you and they will be better prepared.
- Arrange backup communications, such as two-way radios or cellular phones, and have spare batteries and a diesel-driven emergency generator on site.
- Arrange an off-site emergency communications control center, such as a hotel meeting room, just outside the windstorm area, in case it becomes too dangerous to remain on site.
- Determine which company records are vital, and make plans to protect/relocate them.
- Identify a hot site (an off-site data processing location where you can continue business immediately) or a cold site (an off-site location where you can set up your own data processing equipment). Also consider identifying a business recovery facility where you can resume general operations.
- Maintain ongoing agreements with contractors for supplies and repairs that may be needed after a windstorm. If possible, use contractors who are from outside potential windstorm areas. Local contractors may be over-committed.
- Order emergency supplies and maintain them throughout the windstorm season.
- Have straps or other means on hand to brace/anchor yard storage, signs, cranes and roof-mounted equipment.
- Inspect and repair roof coverings and edges a few months before windstorm season.

- Provide pre-fitted windstorm shutters and/or plywood for windows and doorways where practical.
- Perform a dry-run installation of windstorm shutters annually. If practical, leave shutters in place.
- Prepare for windstorm-related flooding with sandbags and an ample supply of brooms, squeegees and absorbents.
- Identify key equipment and stock that must be protected with tarpaulins or waterproof covers.
- Identify and consider removal of any large trees that could fall and damage buildings, fire pump houses or power and communication lines.
- Have plans in place for site security after a windstorm.
- _____
- _____
- _____
- _____
- _____
- _____

Impending Windstorm

Your country’s weather service will provide advance warning to those in areas likely to be in the path of an approaching storm. In the United States, the National Weather Service issues a hurricane watch when winds of 74 mph (120 km/hr) or greater pose a potential threat within 36 hours. A hurricane warning in the United States indicates hurricane conditions are expected in 24 hours. The warning stages differ from country to country, and you should be familiar with the system applied where your facilities are located. Windstorms also can be tracked on the internet. We suggest you use the Web resources shown at the top of page 5. Use the advance warning to begin taking action consistent with your emergency plan.

- Map the windstorm front and stay up-to-date on the storm’s progress.
- Begin implementing your windstorm emergency action plan. Take specific actions based on the predetermined checkpoints outlined in your plan (you have, for example, already determined that you will begin shutting down processes when a storm is a certain distance away).
- Shut down operations that depend on outside power sources in an orderly manner, following established procedures.
- Inspect and make emergency repairs to drains, gutters and flashing.
- Strap or anchor to the roof deck support assembly (e.g., the joists) all roof-mounted equipment such as HVAC units and exhaust vents.
- Check/maintain all necessary backup equipment, such as emergency generators and communication devices.

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Severe Windstorm Checklist

Impending Windstorm (continued)

- Protect/relocate vital records.
- Install windstorm shutters/plywood over windows and doors.
- Take the following steps so that items outdoors will not blow away or cause damage:
 - _____ remove all loose debris
 - _____ anchor or relocate all nonessential equipment to a safe indoor location
 - _____ secure storage of flammable liquid drums, or move them to a sheltered area (but never into main facility areas)
 - _____ anchor all portable buildings (e.g., trailers) to the ground
 - _____ secure large cranes
 - _____ make sure outdoor signs are properly braced
- Inspect all fire protection equipment, such as sprinkler control valves and fire pumps.
- Ensure that the ERT members who volunteered to stay on site have proper supplies and equipment (drinkable water, nonperishable food, medical, flashlights, walkie-talkies).
- Have cash on hand for post-windstorm needs, such as buying food and supplies, or paying employees and contractors.
- Repair and fill above-ground tanks with product or water.
- Fill fuel tanks of generators, fire pumps, and all company-owned vehicles.
- Clean out drains and catch basins.
- Protect computers, machinery, and stock with tarpaulins and waterproof covers.
- Remove as many goods as possible from the floor, or ship them out of the facility.
- Isolate, neutralize, or remove from the site any chemicals that can react violently with each other.
- Shut off gas to minimize fire loss.
- Protect or shut off other possible flame sources.
- Shut down all noncritical and nonessential electrical equipment.
- Disconnect the main electrical feeds to the facility, if possible, to prevent a potential fire caused by short-circuiting of damaged equipment.

Web resources for tracking windstorm progress:

US National Hurricane Center (www.nhc.noaa.gov) North America, Central America, Caribbean

SeaJoint Typhoon Warning Center (www.npmoc.navy.mil/) Asia

Australia Bureau of Meteorology (www.bom.gov.au) Australia, South Pacific and Indian Oceans

During the Windstorm

*Emergency response personnel should stay at the facility **only** if safe to do so.*

Patrol the property continuously and watch for roof leaks, pipe breakage, fire or structural damage. During the height of a windstorm, personnel should remain in a place that has been identified as safe from wind and flood.

Constantly monitor any boilers that must remain on line.

During power failure, turn off electrical switches to prevent reactivation before necessary checks are completed.

After the Windstorm

Secure the site.

Survey for damage.

Survey for safety hazards such as live wires, leaking gas or flammable liquids, poisonous gases, and damage to foundations or underground piping.

Repair damage to the automatic sprinkler system and get it back in service as soon as possible. Use FM Global's Red Tag Permit System Kit (P7427) whenever sprinkler piping and/or water supplies are impaired.

Call in key personnel and notify contractors to start repairs. Make sure safety systems are fully implemented before work is allowed to begin. This means controlling smoking and using the Hot Work Permit System Kit. Require contractors to share responsibility for establishing fire-safe conditions before and during the job.

Begin salvage as soon as possible to prevent further damage:
____ cover broken windows and torn roof coverings immediately
____ separate damaged goods, but beware of accumulating too much combustible debris inside a building

Contact your local FM Global office for assistance in restoring fire protection and reporting the loss.

Clean roof drains and remove debris from roof to prevent drainage problems.

Visually check any open bus bars, conductors and exposed insulators before restarting main electrical distribution systems.

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Severe Windstorm Checklist

After the Windstorm (continued)

Typhoon Categories

(Differs from country to country)

HONG KONG

<i>Category</i>	<i>Minimum Central Sea Level Pressure</i>
1	990 mb or less
2	950 mb or less
3	920 mb or less

TAIWAN

<i>Typhoon Strength</i>	<i>Maximum Wind Speed at Center</i>
Tropical Storm	Below 38 mph (17.2 m/s)
Light	39 to 73 mph (17.2 to 32.6 m/s)
Medium	73 to 114 mph (32.7 to 50.9 m/s)
Strong	Above 114 mph (51 m/s)
Super	Above 150 mph (67 m/s)

JAPAN

<i>Scale</i>	<i>Size of diameter (area) where wind velocity is more than 49.2 ft/s (15 m/s)</i>
Very Small	Radius less than 124 mi (200 km)
Small	Radius less than 124 and 186 mi (200 and 300 km)
Medium	Radius less than 187 and 311 mi (301 and 500 km)
Large	Radius less than 312 and 497 mi (501 and 800 km)
Extra Large	Radius more than 497 mi (800 km)

<i>Strength</i>	<i>Maximum Wind Velocity</i>
Weak	38 to 56 mph (17 to 25 m/s)
Ordinary Strength	57 to 74 mph (25 to 33 m/s)
Strong	75 to 98 mph (34 to 44 m/s)
Very Strong	99 to 121 mph (45 to 54 m/s)
Extremely Strong	Above 121 mph (54 m/s)

Hurricane and Cyclone Categories

Saffir-Simpson Hurricane Intensity Scale

The chart below shows how hurricanes are categorized by wind speeds. Correlations can be made to cyclones, based on the same wind speed measurements. (**Note:** Wind speed is measured on a 60-second mean basis.)

<i>Category</i>	<i>Wind Speed</i>	
	<i>Hurricane</i>	<i>Cyclone (differs by country)</i>
1	74 to 95 mph (120 to 153 km/h)	less than 78 mph (125 km/h)
2	96 to 110 mph (154 to 177 km/h)	78 to 106 mph (125 to 170 km/h)
3	111 to 130 mph (179 to 209 km/h)	107 to 140 mph (171 to 225 km/h)
4	131 to 155 mph (211 to 249 km/h)	141 to 174 mph (226 to 280 km/h)
5	greater than 155 mph (249 km/h)	greater than 174 mph (280 km/h)

CATEGORY 1

- Possible storm surge 4 ft. to 5 ft. (1.2 m to 1.5 m) above normal
- Damage primarily to shrubbery, tree foliage and unanchored mobile homes; no real damage to other structures
- Some damage to poorly constructed signs
- Low-lying coastal roads inundated, minor pier damage, some small craft in exposed anchorage torn from moorings

CATEGORY 2

- Storm surge of 6 ft. to 8 ft. (1.8 m to 2.4 m) above normal
- Considerable damage to shrubbery and tree foliage; some trees blown down
- Major damage to exposed mobile homes
- Extensive damage to poorly constructed signs
- Some damage to roofing materials of buildings
- Coastal roads and low-lying escape routes inland cut by rising water two to four hours before arrival of windstorm center
- Considerable damage to piers, marinas flooded; small craft in unprotected anchorages torn from moorings; evacuation required for some shoreline residences and low-lying islands

CATEGORY 3

- Possible storm surge 9 ft. to 12 ft. (2.7 m to 3.6 m) above normal
- Limbs torn from trees and large trees blown down
- Nearly all poorly constructed signs blown down
- Damage to roofing materials of buildings; some window and door damage
- Mobile homes destroyed
- Serious flooding at coast and many smaller structures near coast destroyed; larger structures near coast damaged by battering waves and floating debris

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Severe Windstorm Checklist

CATEGORY 3 (continued)

- Low-lying escape routes inland cut by rising water three to five hours before windstorm center arrives
- Flat terrain up to 5 ft. (1.5 m) above sea level flooded inland 8 miles (13 km) or more; possible required evacuation of low-lying residences within several blocks of shoreline

CATEGORY 4

- Storm surge 13 ft. to 18 ft. (4 m to 5.5 m) above normal
- Flat terrain up to 10 ft. (3 m) above sea level flooded inland as far as 6 miles (9.6 km)
- Shrubs and trees blown down; all signs down
- Extensive damage to inadequately installed roofing materials, windows and doors; complete failure of roofs on many small residences
- Complete destruction of mobile homes
- Major damage to lower floors of structures near shore
- Low-lying escape routes inland cut by rising water several hours before windstorm center arrives
- Major erosion of beaches; possible required evacuation of all residences within 500 yards (457 m) of shore and single-story residences on low ground within 2 miles (3.2 km) of shore

CATEGORY 5

- Storm surge greater than 18 ft. (5.5 m) above normal
- Shrubs and trees blown down
- Considerable damage to roofs of buildings; all signs down
- Very severe and extensive damage to windows and doors
- Complete failure of roofs of many residences and inadequately designed industrial buildings
- Extensive shattering of glass in windows and doors, some complete building failures
- Small buildings overturned or blown away, complete destruction of mobile homes
- Major damage to lower floors of all structures less than 15 ft. (4.6 m) above sea level within 500 yards (457 m) of shore
- Low-lying escape routes inland cut by rising water several hours before windstorm center arrives; possible required evacuation of residential areas on low ground within 5 to 10 miles (8 to 16 km) of shore

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